

AMENDMENT

Aquatic Plant Management Plan, Lake Kegonsa and Lower Mud Lake, Lower Rock River Basin, Dane County Wisconsin

**Approved by the Dane County Lakes and Watershed Commission on April 10, 2014 and by the
Wisconsin Department of Natural Resources on March 27, 2014**

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Plant surveys conducted by James Scharl of Stantec Consulting Services Inc. (2011 and 2012) for the Dane County Office of Lakes and Watersheds, and by Michelle Nault, Martha Barton, and Erin Vennie-Vollrath from the Wisconsin Department of Natural Resources (2012). DNR fieldwork was supported by the U.S. Environmental Protection Agency's National Lakes Assessment. Lake Kegonsa was randomly selected to be surveyed as part of the Assessment. Funding to support this plan amendment was also provided by a Wisconsin Department of Natural Resources grant to the Dane County Office of Lakes and Watersheds.

Introduction

This is an update to the Aquatic Plant Management Plan, Lake Kegonsa and Lower Mud Lake, Lower Rock River Basin, Dane County Wisconsin, published in January 2007 by the Dane County Office of Lakes and Watersheds. The 2007 plan was approved by the Wisconsin Department of Natural Resources on March 17, 2007 and by the Dane County Lakes and Watershed Commission on April 12, 2007. Aquatic Plant Management Plans are required under NR 109.04(d), Wisconsin Administrative Code, to guide mechanical harvesting activities and the effective management of aquatic plants in water bodies.

Please note that the Yahara River between Monona and Upper Mud Lake, Waubesa to Lower Mud Lake, and Lower Mud Lake to Lake Kegonsa is addressed in the 2013 Yahara River and Upper Mud Lake Aquatic Plant Management Plan.

This plan is prepared in support of Dane County's permit for its mechanical aquatic plant harvesting program, operated in accordance with NR 109 Wisconsin Administrative Code. Individuals and groups that propose herbicide treatments of aquatic plants in Dane County waters would need to go through a separate planning and permitting process with the Wisconsin Department of Natural Resources.

Recent Plant Survey Methods and Results

Dane County contracted with Stantec Consulting Services Inc. to conduct surveys of the aquatic plant community of Lake Kegonsa on July 26-27, 2011, and Lower Mud Lake on July 13, 2012. Stantec followed state protocols and used the point intercept method. Wisconsin DNR also

completed a survey of Lake Kegonsa in 2012 as part of EPA’s National Lakes Assessment. Refer to the point intercept maps in the 2007 plan for the sampling locations for both the Kegonsa and Lower Mud surveys.

Table 1 below indicates species present in Lake Kegonsa during the 2011 survey, and Figure 1 indicates species richness from 1990-2011. Table 2 and Figure 2 refer to species present during the 2013 survey of Lower Mud Lake, and species richness in Lower Mud Lake from 2006 to 2012.

Table 1. Species present during 2011 aquatic plant survey – Lake Kegonsa

Genus	Species	Common Name	Category
<i>Ceratophyllum</i>	<i>demersum</i>	Coontail	Submersed
<i>Herteranthera</i>	<i>dubia</i>	Water star-grass	Submersed
<i>Elodea</i>	<i>canadensis</i>	Common waterweed	Submersed
<i>Myriophyllum</i>	<i>spicatum</i>	Eurasian watermilfoil	Submersed-Invasive
<i>Potamogeton</i>	<i>crispus</i>	Curly-leaf pondweed	Submersed-Invasive
<i>Potamogeton</i>	<i>zosteriformis</i>	Flat-stem pondweed	Submersed
<i>Vallisneria</i>	<i>americana</i>	Wild celery	Submersed
<i>Zannichellia</i>	<i>palustris</i>	Horned pondweed	Submersed

Figure 1. Species richness – Lake Kegonsa 1990 - 2011

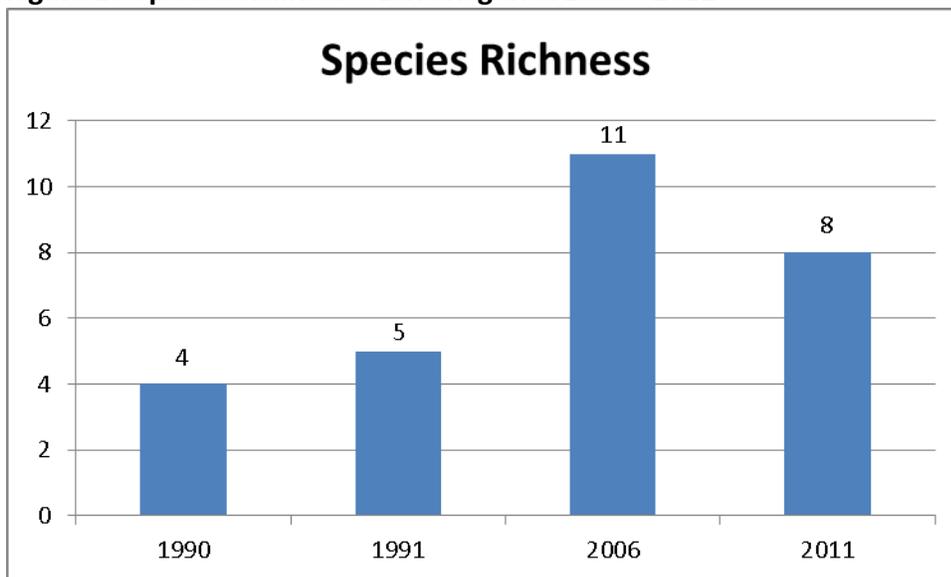
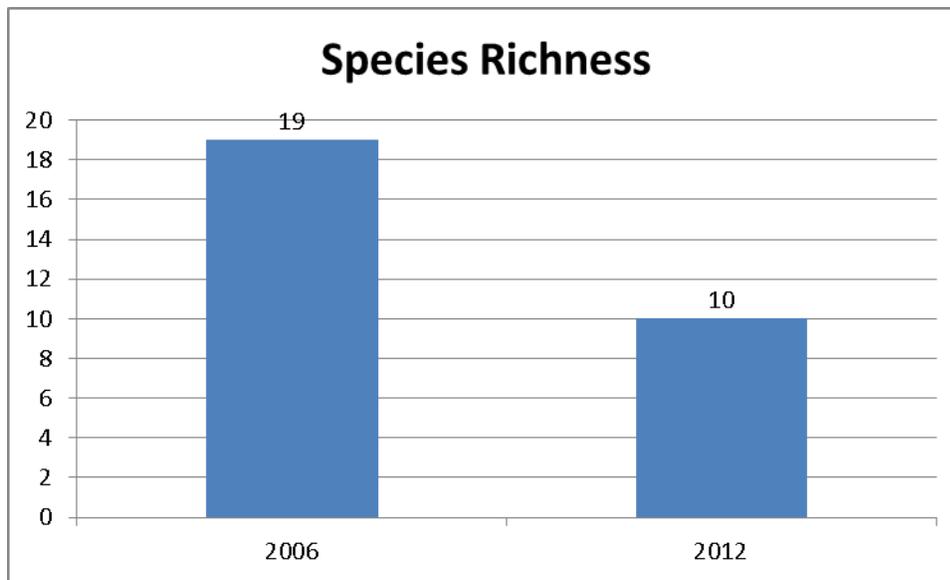


Table 2. Species present during 2012 aquatic plant survey – Lower Mud Lake

Genus	Species	Common Name	Category
<i>Algae</i>	<i>sp.</i>	Filamentous algae	Submersed
<i>Ceratophyllum</i>	<i>demersum</i>	Coontail	Submersed
<i>Chara</i>	<i>sp.</i>	Muskgrass	Submersed
<i>Elodea</i>	<i>canadensis</i>	Common waterweed	Submersed
<i>Heteranthera</i>	<i>dubia</i>	Water star-grass	Submersed
<i>Lemna</i>	<i>minor</i>	Small duckweed	Free-floating
<i>Myriophyllum</i>	<i>spicatum</i>	Eurasian watermilfoil	Submersed - Invasive
<i>Potamogeton</i>	<i>richardsonii</i>	Clasping-leaf pondweed	Submersed
<i>Vallisneria</i>	<i>americana</i>	Wild celery	Submersed
<i>Wolffia</i>	<i>columbiana</i>	Common watermeal	Free-floating

Figure 2. Species richness – Lower Mud Lake 2006 - 2012



Appendix A includes Lake Kegonsa plant statistics from the 2011 Stantec survey. Appendix B includes Lower Mud Lake plant statistics from the 2012 Stantec survey. Appendix C includes mapped plant distributions for both Lake Kegonsa and Lower Mud Lake.

Discussion of historical plant community changes

Statistical measures (e.g. Floristic Quality Index, Coefficient of Conservatism) used in this section are more fully described in the 2007 aquatic plant management plan. Please refer to that plan for additional background.

Lake Kegonsa

The aquatic plant community on Lake Kegonsa has varied among all surveys conducted since 1990. Initial surveys in 1990 and 1991 showed very limited aquatic plant communities which increased substantially in 2006 and then dropped off slightly in 2011.

The aquatic plant community of Lake Kegonsa was re-surveyed on July 26-27, 2011. Earlier surveys found only four and five aquatic plant species in 1990 and 1991, respectively. These surveys were dominated by Eurasian watermilfoil (EWM), coontail, and sago pondweed. However, in 2006 the species abundance increased to 11 while maximum depth of plant growth remained relatively stable. Coontail and EWM were still the two most abundant species during this survey. In 2011, species diversity decreased to eight and the maximum depth of plants remained consistent with historical averages. Horned pondweed was the most prevalent species found with EWM and coontail following.

Over the 2006 and 2011 sampling periods, the Floristic Quality Index (FQI) decreased while the average coefficient of conservatism (C) increased. FQI evaluates the closeness of the flora to an undisturbed ecosystem. The higher the FQI the closer that plant community composition is to an undisturbed ecosystem. C values range from 0 to 10 and represent an estimated probability that a plant is likely to occur in a landscape relatively unaltered from a pre-settlement condition. Lower numbers indicate more of a disturbed ecosystem while higher values indicate a community more likely to have been found pre-settlement. From 1989-1991, the FQI and average C were stable relatively low ranging from 4.24 to 6.93 for the FQI and 3.0 to 4.0 for average C, respectively. In 2006, these rose to 14.33 and 4.78. However, the FQI fell during the 2011 survey to 12.66 and average C rose to 5.17. These values can be used to gauge the health of the lake. Though the FQI fell during 2011, the increased average C shows a stable plant community with limited diversity.

Using the 2006 and 2011 surveys, 11.0 and 8.0 species were identified, respectively. The higher the species richness the better, and generally the better water quality results in higher species numbers. When WDNR sampled the lake in 2012, it documented that species richness went back up to 10. Though maximum depth of plant growth decreased from 9.0 feet to 8.0 feet, the amount of photic zone inhabited by plants decreased from 45.48% to 58.87% in 2011. Horned pondweed saw the biggest increase in abundance from 4.2% relative frequency to 35.1% while EWM decreased slightly. Flat-stem pondweed is a new species found during the 2011 survey while curly-leaf pondweed, which was not found in 2006, was again present. Filamentous algae, small duckweed, leafy pondweed, clasping-leaf pondweed, and sago pondweed were not identified in 2011 but were found in 2006. While these species were likely present during each survey, due to the relatively low frequency of occurrence and the dynamic nature of aquatic ecosystems their abundance may have changed slightly between the two surveys. The presence or absence of these species should continue to be monitored on future surveys.

Wisconsin DNR staff also conducted a point-intercept aquatic plant survey in 2012, as part of the US Environmental Protection Agency's National Lakes Assessment.

Lower Mud Lake

Lower Mud Lake was last sampled in 2006. Since then, the aquatic plant community has seen minor changes. During both the 2006 and 2012 surveys, 19 and 10 species were found, respectively, with coontail and filamentous algae being the two most prevalent species during each survey. There are a few, minor changes evident in the community as a whole and single species abundance.

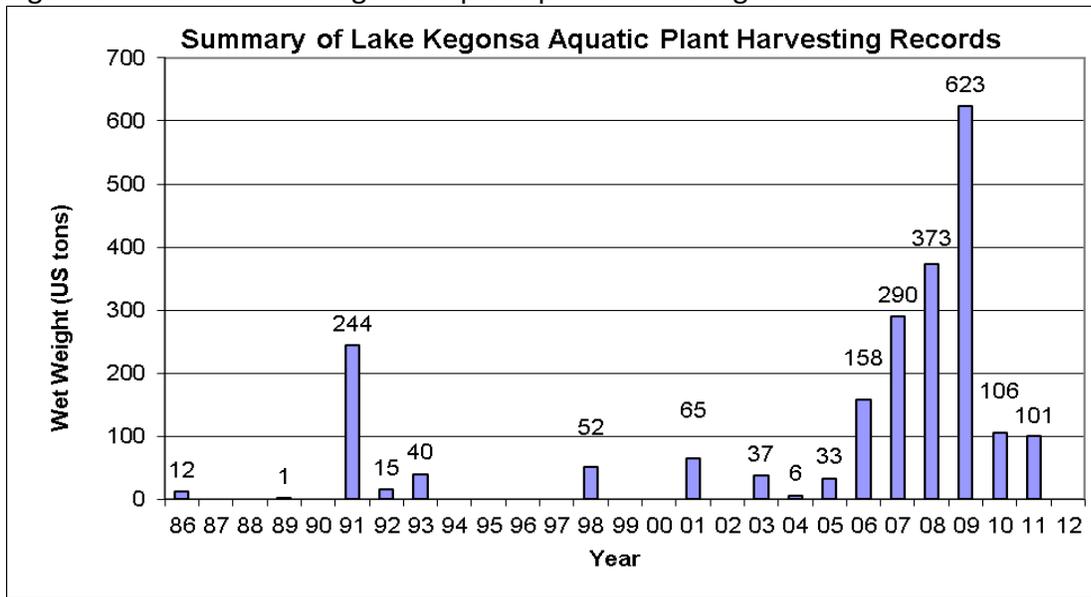
The aquatic plant community of Lower Mud Lake was surveyed on July 13, 2012 with low water, heavy aquatic plant growth, and algae mats limiting navigation and access to some locations of the lake. For the 2012 plant community, maximum depth of plants decreased to 3.0 feet from 5.0 feet found during the 2006 survey; a direct correlation to the drop in water level from 2006. Aquatic plant community data remained relatively stable from 2006 to 2012. Over these sampling periods, frequency of occurrence within the littoral zone (the shallowest part of the lake where most of the aquatic plants grow) decreased slightly from 97.15% to 94.17%, species richness fell from 19 to 10, and FQI decreased. However, diversity per sample location increased in 2012 from 2.91 to 3.34 at vegetated sites while their distribution remained nearly constant with a Simpson Diversity Index of 0.85 and 0.84. During 2006, the FQI and average C were 20.25 and 5.06, respectively. In 2012, the FQI and average C fell to 13.79 and 4.88 respectively. However, heavy aquatic plant growth and shallow water limited navigational access to some sample points and data collection.

Similar aquatic plant communities were present during each survey. Coontail and filamentous algae were present in both surveys along with high numbers of free-floating species. Nine species present during the 2006 survey were absent in 2012. However, because of limited navigational access due to low water conditions and constant overall plant community data, there is little overall change between years. The presence or absence of these species should not be a cause for concern and a healthy, albeit dense, aquatic plant community remains in Lower Mud Lake.

Recent Chemical and Harvesting Aquatic Plant Management Records

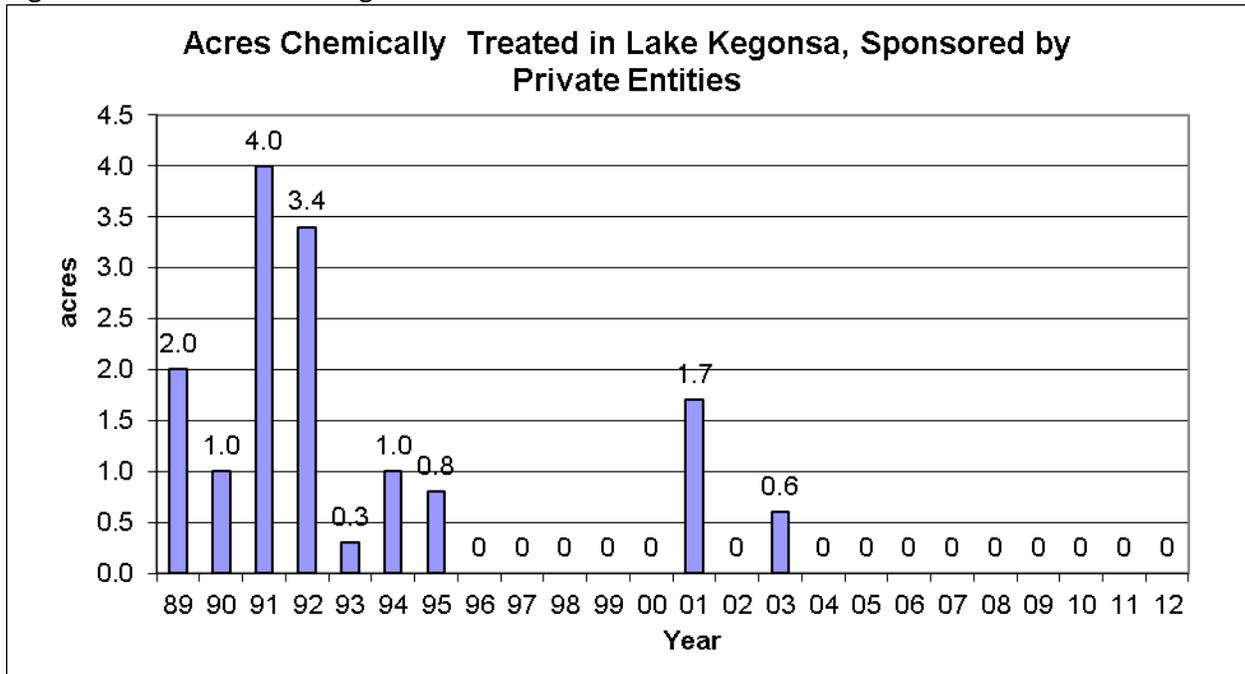
Figure 3 summarizes Dane County's mechanical harvesting operations in Lake Kegonsa since 2006. There was no need to harvest plants in 2012 for access to recreation or navigation. Figure 4 summarizes private entities' chemical treatment of Lake Kegonsa since 1989. No mechanical harvesting or chemical treatment has ever been conducted in Lower Mud Lake.

Figure 3. Historical Lake Kegonsa aquatic plant harvesting records



Please note that, starting in 2006, Dane County changed the way it records total harvested plant weight. In the 2007 plan for Lake Kegonsa and Lower Mud Lake, one truck load of harvested plants was equated with one ton. Beginning in 2006, Dane County uses a formula to more precisely estimate the wet weight of one truck load, expressed in U.S. tons. What may seem to be a dramatic increase in harvested plant amounts compared to 2005 and earlier is likely mostly due to this change in estimating harvested weights.

Figure 4. Historical Lake Kegonsa chemical treatment records



Public input opportunities

Dane County Land and Water Resources Department staff held a public information and input meeting on April 16, 2013 at the Village of McFarland Municipal Center -- Training Room, with 18 area residents present. The focus of the meeting was lakes Waubesa and Kegonsa, Yahara River, Upper and Lower Mud Lake, Jenni and Kyle Ponds, and Verona Quarry.

Attendees represented Friends of Lake Kegonsa Society, Lake Waubesa Conservation Association, Waubesa Beach Neighborhood Association, and others who enjoy Lake Kegonsa and Lake Waubesa for recreation and aesthetics.

At this meeting, Dane County and DNR staff presented current plant data (the maps found in Appendix C), following an overview of the ecological importance of aquatic plants and the current harvesting operation. Dane County staff invited comments on suggested revisions to the plan goals, recommendations, and harvesting operations.

Several comments were provided during the meeting. No specific suggestions were made about updating the 2007 plan's goals and recommendations. The main points made related to the harvesting program were the need for more harvesting, research on EWM early season intervention and results, reason for plant growth variation from year to year, allocation of harvesters to lakes or areas, early harvesting to better control exotics, and impact of harvesting on fish. No revisions to plan goals or recommendations were suggested for Lake Kegonsa. There were no questions or comments about the Lower Mud Lake data or harvesting.

Public comments were also solicited via email, press release, and the danewaters.com website. No direct emails or correspondence was received regarding Lake Kegonsa and Lower Mud Lake.

A draft plan amendment was posted on the Office of Lakes and Watersheds website (www.danewaters.com) in spring 2013 and comments requested via email and other outreach. The only comments received recommended clarity and definitions, but not substantive changes to plan content. The final draft plan amendment was posted for comment in spring 2014, and no comments were received.

Aquatic Plant Management in Dane County

The overall goal of Dane County's mechanical harvesting program is to cut and harvest Eurasian watermilfoil and other invasives to help provide for reasonable use of the lakes for boating, fishing and swimming, while preserving the health and balance of the lake ecosystem. During periods of high water, harvesting of plants in the Yahara River between lakes Waubesa and Kegonsa becomes the highest priority.

Aquatic plant growth varies from lake to lake and year to year. Dane County employs a Plant Scout to evaluate plant growth conditions and recommend appropriate harvesting in response, within the limits of the plan harvesting priority areas and DNR permit. In times of heavy plant

growth, local residents often advocate for additional harvesting in their areas, harvesting longer into the season (into the fall), or dedicating a harvester for a particular waterbody. County managers need to balance staff and harvesting equipment resources and priorities with needs and ecological conditions countywide. Local groups or individuals always have the option of contracting with the county for additional harvesting and special event harvesting, within the boundaries of the permit. Additional information about contract harvesting is available here: www.countyofdane.com/lwrp/parks/aquatic_plant_harvesting2.aspx#garden.

Dane County, Wisconsin Department of Natural Resources, and the U.S. Army Corps of Engineers completed a research project in 2013 that evaluated the response of selective early-season herbicide application and cutting of aquatic plants on Turville Bay, the southwest area of Lake Monona, on Eurasian watermilfoil (EWM, an invasive aquatic exotic plant) and on native plant communities. The complete project report and a summary fact sheet are available at www.danewaters.com.

Eurasian watermilfoil begins growing early in the year, and creates a dense growth canopy which shades out native plant species. Cooperating scientists and managers wondered if controlling EWM early in the season would give an advantage to native plants. The research project found that both herbicide and harvested early-season treatment resulted in significant decreases in EWM. Mechanical harvesting produced more variable results, but better protected native coontail plants. The herbicide treatment resulted in longer control of EWM than mechanical harvesting.

One outcome of this research is that Dane County staff may identify small areas in larger lake systems for early-season mechanical harvesting to provide nuisance control of EWM, as resources and priorities permit.

Dane County holds annual training sessions for new and returning harvester operators before the harvesting season begins. In that training, permanent and seasonal staff receive instruction on many topics including aquatic invasive species prevention protocols, plant identification, and communications. The Lakes Management Supervisor directs the day-to-day operations of the staff, guided by the Parks Director who is informed of plant conditions and harvesting needs by the Plant Scout. Particular concerns with a water body; deep versus shallow harvesting; collection of plant fragments from harvesters, plant senescence, and boat propellers etc. are all addressed in the supervision.

Working closely with the Wisconsin Department of Natural Resources, the Dane County Land and Water Resources Department has developed harvesting priority maps that are included in many of the aquatic plant management plans and referred to in DNR harvesting permits issued to Dane County. Not every area that is identified for potential harvesting on the map will be harvested in any given harvesting season if there is little to no plant growth, because attention to higher priority areas does not permit it, or due to budget constraints. Harvester operators are instructed not to cut and remove plants outside of harvesting priority areas identified on these maps, unless authorized by their Supervisor in consultation with the Wisconsin Department of Natural Resources.

Harvesting machines are designed to collect and remove plant fragments. Dane County also helps clean up plant materials at beaches and other public access points, even when the plant material is not associated with harvesting operations.

Limits of the equipment, staff, and budget mean that plant harvesting for aesthetics, collection of wind-blown plant fragments due to boat propeller action, and the removal of plants that release from the sediment and float free in the fall cannot generally be accomplished. However, program managers do their best to accommodate requests for collection of naturally-occurring windblown and boat motor chopped plant fragments near shorelines, as time and budget permit. The Dane County Lake Management Operations Manual provides instructions to harvesting machine operators about plant fragment collection.

There is a common misperception that excessive external nutrients carried into lakes in runoff from the watershed causes macrophyte (large aquatic plant) problems. In fact, external nutrient loading usually produces algal blooms that shade and reduce macrophyte biomass. Attempts to control biomass by controlling nutrients in the water column are unproductive, according to G. Dennis Cooke and others in the third edition of *Restoration and Management of Lakes and Reservoirs* (2005). This is because rooted macrophytes, such as the nuisance Eurasian watermilfoil, usually get their phosphorus and nitrogen directly from sediments. In the short-term, reduced phosphorus in the water column resulting from watershed controls may actually result in more macrophyte growth, because clearer water permits more light penetration that fosters plant growth.

It could take many years to reduce the historical nutrient additions to lake sediments especially in agricultural areas. Much important work is underway in the Yahara River watershed to reduce watershed phosphorus loadings. Long-term, scientists and managers hope that community efforts can reduce sediment phosphorus, thereby more directly affecting plant growth.

Recommended management

Based on staff review of the plant survey data and public input, Dane County recommends the updated management elements found in this section.

Lake Kegonsa Goals

Recognizing that Eurasian watermilfoil has dominated the littoral zone for several decades, the goals for managing Lake Kegonsa aquatic plants are to: (1) sustain favorable recreational access in areas where exotic plant densities become a nuisance, (2) identify opportunities for establishing floating-leaf plants, and (3) designate undeveloped public shorelines as Critical Habitat Areas. Floating-leaf plants that could be established include yellow water lily (*Nuphar variegatum*), white water lily (*Nymphaea odorata*), and American lotus (*Nelumbo lutea*). Favorable nearshore habitat is generally lacking in Lake Kegonsa, however publicly owned

shorelines and wetlands may provide opportunities for improving nearshore submersed and floating-leaf habitat.

These overarching aquatic plant management goals are coupled with the more specific goals of Dane County's mechanical harvesting program: to cut and harvest Eurasian watermilfoil and other invasives to help provide for reasonable use of the lakes for boating, fishing and swimming, while preserving the health and balance of the lake ecosystem.

Lake Kegonsa Recommendations

1. Conduct mechanical harvesting only when Eurasian watermilfoil and other nuisance plants significantly impair recreational use.
2. Critical Habitat Areas should include undeveloped portions of the lake including Fish Camp, Lake Kegonsa State Park and the Door Creek wetlands. (Designation of Critical Habitat Areas is a Wisconsin Department of Natural Resources decision.)
3. The Dane County Plant Scout should document occurrences of high value native plants in regular scouting reports, including shoreline reference and GPS location. Dane County staff should make an annual summary report of these occurrences available to the public.
4. Dane County mechanical harvesting crews should continue to take steps to prevent the spread of exotic invaders across Dane County lakes and streams. These steps include removing any visible plants, mud, debris, water, fish or animals from the machinery and thoroughly washing the equipment.

Lower Mud Lake Recommendations

1. As conditions warrant (e.g. during emergency high water and flood conditions), conduct large-scale mechanical harvesting of aquatic plants in Lower Mud Lake and in the river between Lower Mud Lake and Lake Kegonsa to increase flow. Harvesting is not recommended at all other times, because the wetland and aquatic plants in Lower Mud Lake provide water quality benefits to Lake Kegonsa. When cutting is performed it should avoid mechanical hazard zones.
2. Chemical treatments should not be conducted in the lake given the general lack of riparian development. Uses within the natural shoreline eliminate the need for treatments typically used to clear swimming areas and piers.
3. The Critical Habitat Areas designation should include the entire shoreline given the relatively undeveloped condition. The habitat functions in Lower Mud Lake may benefit Lake Kegonsa where critical aquatic plant habitats were scarce. (Designation of Critical Habitat Areas is a Wisconsin Department of Natural Resources decision.)
4. The Dane County Plant Scout should document occurrences of high value native plants in regular scouting reports, including shoreline reference and GPS location. Dane County staff should make an annual summary report of these occurrences available to the public.

5. Dane County mechanical harvesting crews should continue to take steps to prevent the spread of exotic invaders across Dane County lakes and streams. These steps include removing any visible plants, mud, debris, water, fish or animals from the machinery and thoroughly washing the equipment.

Proposed Critical Habitat Areas

Wisconsin DNR's website describes the importance of the DNR's designation of Critical Habitat Areas as follows: "Every waterbody has critical habitat - those areas that are most important to the overall health of the aquatic plants and animals. Remarkably, eighty percent of the plants and animals on the state's endangered and threatened species list spend all or part of their life cycle within the near shore zone. As many as ninety percent of the living things in lakes and rivers are found along the shallow margins and shores. Wisconsin law mandates special protections for these critical habitats. Critical Habitat Designation is a program that recognizes those areas and maps them so that everyone knows which areas are most vulnerable to impacts from human activity. A critical habitat designation assists waterfront owners by identifying these areas up front, so they can design their waterfront projects to protect habitat and ensure the long-term health of the lake they where they live.

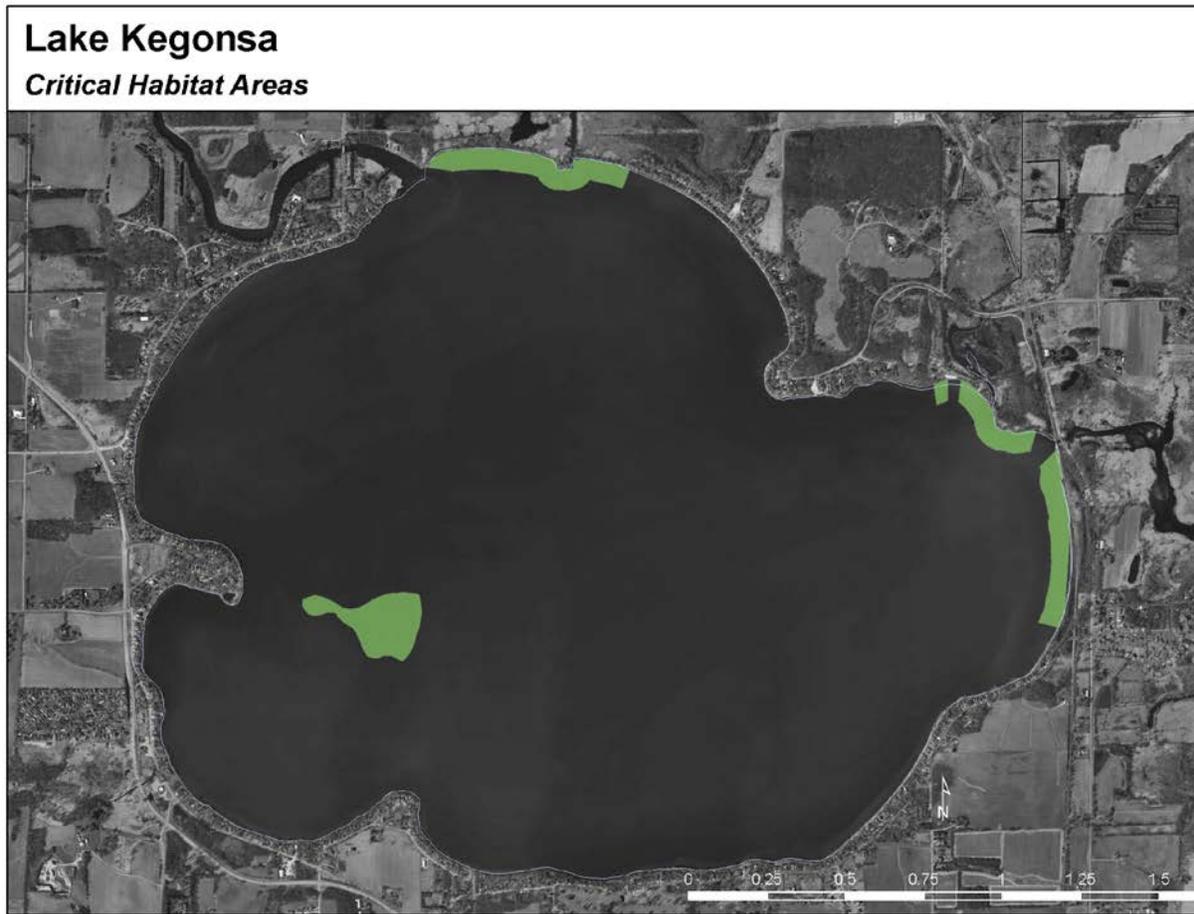
Lake Kegonsa

To the proposed Critical Habitat Area map below (Figure 5), Dane County staff also recommends adding the offshore reef directly east of Colladay Point and north of Lunds Point. Offshore reef areas provide important habitat for numerous fish species. Similar areas are already protected on Lakes Mendota, Monona, and Waubesa and designating this area on Lake Kegonsa will bring it in line with the other lakes on the Chain.

Lower Mud

No changes are recommended to the Critical Habitat (formerly called "Sensitive") Areas proposed in the 2007 aquatic plant management plan. The east and west shores are undeveloped and with emergent and floating-leaf plant communities creating excellent fisheries habitat. This will still allow for mechanical harvesting of the main lake channel for recreational access.

Figure 5. Proposed Lake Kegonsa Critical Habitat Areas



Harvesting Priorities

Dane County holds annual training sessions for new and returning harvester operators before the harvesting season begins. In that training, permanent and seasonal staff receive instruction on many topics including aquatic invasive species prevention protocols, plant identification, and communications. The Lakes Management Supervisor directs the day-to-day operations of the staff, guided by the Parks Director who is informed of plant conditions and needs by the Plant Scout. Particular concerns with a water body, deep v. shallow harvesting, collection of plant fragments from harvesters, plant senescences, boat propellers etc. are all addressed in the supervision.

The harvesting priorities map for Lake Kegonsa (Figure 6) shows areas that may be harvested. Additional background on harvesting priorities is found in the Lake Management Operations Manual and posted on the Office of Lakes and Watersheds website (www.danewaters.com). Annual training and daily supervision of harvester operators reinforce that plants should be harvested only from these planned areas, unless a variance from the plan has been approved

by Wisconsin DNR. Actual effort is dictated based on plant conditions, as evaluated and reported by Dane County's Plant Scout.

Figure 6. Lake Kegonsa harvesting priorities

